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ABSTRACT

This paper proposes a method for studying the effect of an individual difference variable--field dependence-independence--on the ability of a student to read and understand text information presented on a computer screen. It is argued that in order to improve individualized instruction, learning must be related to predictions of what part of the environment individuals will process based on individual difference variables. Participants of the proposed study will be 200 undergraduates divided into two groups: one group will receive a selection of instructional text on a microcomputer containing key words used as center and side headings; the other group will receive the same selection of instructional text minus the center and side headings. Although findings are not presented, based on the review of the literature, the following hypotheses have been developed: (1) there will be a significant difference between field dependent (FD) participants and field independent (FI) participants on scores of tests on instructional text with center and side headings and without center and side headings; (2) FI participants will score significantly higher than FD participants when the text does not contain center and side headings; and (3) FD participants will score at least as well as FI participants when the text does contain center and side headings. (15 references) (EW)

Individualizing Instruction with Microcomputer Produced Text

by

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Background

For much of its history, education in this country has meant "school operations that were uniform in reflecting group norms" (Fantini, 1980, p. 28). Much of the research in education has been directed along the lines of finding the best method for delivering information to a normative group. The assumption was that there was one method that was best for all students. As a result, educational programs were designed for groups of students, such as a particular grade or age level.

In daily practice this required each student to adapt as best as he or she could to the educational method being used. Yet few people would deny that in any group of students there exists a wide range of differences in ability to handle information in a subject area. Those most successful at adapting to the instructional method being used advanced within the educational system, while those less able to make use of what the system offered often withdrew and/or were placed in special tracks.

Educators have long expressed dissatisfaction with this approach. In 1911, Edward L. Thorndike called for breaking away from this uniformity in order to design instruction better suited for the needs of the individual. This thinking was echoed by Carleton Washburne in 1925. In his introduction to the twenty-fourth yearbook of the National Society for the Study of Education entitled "Adapting the Schools to Individual Differences," he wrote:

> Throughout the educational world there has therefore awakened the desire to find some way of adapting schools to the differing individuals who attend them. (p. x)

To date, however, little progress has been made in designing and implementing instruction for the individual. Although educational reformers have introduced a variety of innovations, most of these innovations have not dealt with individual differences of the students. The majority of these approaches have been comparisons between new "Method B" applied to all the students and existing "Method A." As a result new methodologies have seldom shown any real improvement in the educational process.

Individualizing Education

The concept of designing instruction for the individual rather than for a group has received renewed interest in the past two decades. Snow and Salomon (1968) state:

> If the variables used to stratify the group are well chosen, then at least the stage has been set for a new kind of instructional improvement, one based on the hypothesis that there is no "one best way" to teach anything (p. 343).

In 1980 Fantini wrote about the progress to date:

> The age-old fact that no two people are alike, that they have different needs, unique interests, talents, aspirations and problems, and learn in different ways has finally begun to penetrate the mainstream of our schools. Consequently, the school front has become the scene of a revolutionary struggle to alter institutional uniformity geared to group norms toward structures in which the individual uniqueness of the learner is given fuller play..
> Attempts to find one method that would reach 100 percent is fruitless... The point is that we are now at a stage theoretically and practically in which we should be able to generate the capacity to tailor programs to fit individuals. No one method can be considered superior to the other except as it contributes to the learning of the individual (p. 28, 30).

Ausubel (1968) defined perception as an awareness of an object or event prior to the cognitive processing of that object or event. Due to the amount of information to which people are exposed, perception must be selective. This selection is based upon their experiences, expectations, goals, values and other influences--in other words, their individual differences. People continually scan the available stimuli and select certain stimuli for processing. Exactly how a person scans a field and to what parts he/she pays attention is greatly influenced by differences within the individual. By looking at how individuals differ on certain variables, it may be possible to make predictions as to what parts of the environment they will process. By relating this information to learning, it then becomes feasible to apply it in the design of instruction.

The Study

The current study attempts to relate an individual difference variable to one aspect of learning. The learning process being used is the ability of the student to read and understand text information presented on a computer screen. The study employs the Trait-Treatment-Interaction or TTI methodology using field dependence-independence as the trait.

This study follows the writings of several authors (Snow and Salomon, 1968; Glaser, 1972; Ingersoll, 1974; Di Vesta, 1975) who have suggested that the emphasis in research on learning should be on the cognitive processes of the individual working with a particular learning performance.

> Both traits and treatments may affect, and in some cases will dictate, whether the receivers will attend, to what they attend, whether they will try to learn by rote or for understanding, whether they will form images or verbal statements, whether they prefer to use the visual over the auditory modality, and so on (Di Vesta, 1975, p. 189).

The TTI methodology was chosen because it allows the manipulation of one or more treatments in conjunction with traits of the participants. The results are intended to show how interactions between one or more of the treatments and one or more traits of the subject affect the outcomes.

Field dependence-independence is used as the trait because it has been the subject of considerable study and a number of the characteristics identified with field dependent or field independent individuals seem to have a relationship to learning. Generally, field dependent individuals are governed to a large extent by the organization of the field. Field independent individuals are characterized by an articulated cognitive style. This type of person analyzes and structures experiences depending upon the task at hand and is not as easily influenced by a structure that is present.

Neither end of the continuum is clearly superior in concept attainment or other aspects of learning. Field dependence-independence is related much more closely to **how** people learn than to **how much** is learned.

A list of field dependent-independent characteristics that relate to learning include:

Field Independents	Field Dependents
1. Impose organization of unstructured field.	1. Take organization of field as given.
2. Sample fully from the nonsalient features of a concept in order to attain the relevant attributes and to form hypotheses.	2. Dominated by the most salient features of a concept in the attainment of the relevant attributes and in hypothesis formation. Can sample fully from set of features if they are in discrete form.
3. Utilize the active approach to learning, the hypothesis testing mode.	3. Utilize the passive approach to learning, the intuitive mode.
4. Learning curve is discontinuous--no significant improvement in learning a new concept until the appropriate hypothesis is found, then sudden improvement.	4. Learning curve is continuous--gradual improvement as relevant cues are sampled.
5. Use mnemonic structures and reorganize materials for more effective storage and retrieval of information.	5. Use existing organization of materials in cognitive processing.
6. Learn to generalize to object and design concepts more readily.	6. Less effective in generalizations from original design to variations on basis of common components.
7. Prefer to learn general principles and acquire them more easily.	7. Prefer to learn specific information and acquire it more easily. (Thompson, 1987)

Fleming and Levie (1978) state that performance on a learning task is more rapid if the salient cues are relevant and less rapid if the salient cues are irrelevant to the learning task. Since field dependents tend to be dominated by salient cues, and ignore nonsalient cues, Goodenough (1976) hypothesized that when the salient cues are relevant, field dependents would learn the material at least as easily as field independents since they (field dependents) pick out the salient cues for processing. He further suggested that field dependents might learn the material more easily under these conditions due to their reliance on salient cues.

Witkin et al., (1977) found that field dependent people, who lack the ability to organize or structure information internally, are aided by materials that provide structure. The more structured the mediator the more that field dependent person's performance was helped.

A previous study using FDI and center and side headings as salient cues in printed instructional text (Thompson, 1987) did show an improvement in the scores for field dependent participants when the cues were present. In addition, field independent participants scored higher when using the text without the headings. This latter finding seems to indicate that the imposed structure interfered with the cognitive processing of the field independent participants.

Based upon this research, it appears plausible that FDI has an influence upon the way in which an individual gains information from his/her learning environment. A problems arises in the fact that the delivery system was printed text. This severely limits the amount of individualizing of instruction a teacher can do, if different versions of handouts must be generated within each group of students.

With the increase of newer technologies in the classroom, a possible solution to this logistical problem has presented itself. Restructuring information for individuals is a relatively simple task when using a microcomputer as the delivery system. Therefore, instructional text as presented on a microcomputer screen has been chosen as the medium for distributing the instructional information. Specifically this study will attempt to determine if the presence or absence of headings aids in the cognitive processing of the material as presented on a microcomputer screen.

Methodology

The participants in the study will be classified on the individual difference variable field dependence-independence using the Group Embedded Figures Test. Then the participants will be divided randomly into two groups: one half will receive a selection of instructional text on a microcomputer containing key words used as center and side heading; the other group will receive the same selection of instructional text minus the center and side headings. After reading the instructional text, both groups will take an objective test over the information.

The sample for the study will be approximately 200 undergraduate college students enrolled in at the University of Wisconsin Stevens Point during 1987-1988. The approximate age range of the students is 18 to 30 years. An undergraduate college population was chosen because the individual difference variables used here are relatively stable at this age (Wolitzky and Wachtel, 1973).

Hypotheses

Based upon the review of the literature the following hypotheses have been developed:

1. There will be a significant difference between field dependent participants and field independent participants on scores of tests over instructional text with center and side headings and without center and side headings.

2. Field independent participants will score significantly higher than field dependent participants on tests over instructional text when the instructional text does not contain center and side headings.

3. Field dependent participants will score at least as well as field independent participants on tests over instructional text when the instructional text does contain center and side headings.

Statistical Analysis

The design of this study involves the use of two independent variables--field dependence-independence, and the presence/absence of center and side headings in the instructional text, and one dependent variable--the score on a written test over the reading material. For these reasons the statistics chosen will be a two-way analysis of variance.

Bibliography

Ausubel, D. P. Educational psychology: A cognitive view. New York: Holt, Rinehart & Winston, 1968.

Davis, J. K. & Frank, B. M. Learning and memory of field dependent-independent individuals. Journal of Research in Personality, 1979, 13, 469-479.

Di Vesta, F. J. Theory and measures of individual differences in studies of trait by treatment interaction. Educational Psychologist, 1973, 13, 5-12.

Di Vesta, F. J. Trait-treatment interactions, cognitive processes, and research on communication media. AV Communication Review, 1975, 23, 185-196.

Fantini, M. D. A contemporary approach to individualization. Theory into Practice, 1980, 19, 28-31.

Fleming, M. & Levie W. H. Instructional Message Design. Englewood Cliffs, N. J.: Educational Technology Publications, 1978.

Glaser, R. Individuals and learning: The new aptitudes. Educational Researcher, 1972, 1 (6), 5-13.

Goodenough, D. R. The role of individual differences in field dependence as a factor on learning and memory. Psychological Bulletin, 1976, 83, 675-684.

Ingersoll, G. An instructional decision-making model for individual differences in reading. Journal of Reading Behavior, 1974, 6, 77-80.

Misanchuk, E. R. & Schwier, R. A. Learner analysis and the designer of instructional materials: An invitation to involvement in research. Performance and Instruction, 1981, 20 (2), 5-7.

Snow, R. E. & Salomon, G. Aptitudes and instructional media. AV Communication Review, 1968, 16, 341-357.

Thompson, M. E. & Thompson, M. E. Field dependence-independence and learning from instructional text. Proceedings of Selected Research Paper Presentations of The Research and Theory Division, Washington, D. C., Association for Educational Communications and Technology, 1987.

Thorndike, E. L. Individuality. Boston: Houghton Mifflin, 1911.

Witkin, H. A., Moore, C. A., *Goodenough, D. R. & Cox, P. W. Field-dependent and field-independent cognitive styles and their educational implications. Review of Educational Research, 1977, 47, 1-64.

Wolitzky, D. L. & Wachtel, P. L. Personality and perception. In B. B. Wolman (Ed.) Handbook of General Psychology. Englewood Cliffs, N. J., Prentice-Hall, 1973.